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POLLUTION CONTROL THROUGH ODD – EVEN RULE:
A CASE STUDY OF DELHI

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Abstract
The pollution levels in Delhi at alarming levels triggered severe action to be taken to task. The research revealed that the main reason for pollution is transport and road dust. So Delhi Government decided to implement a trial run of odd even car rule for 15 days. This paper focuses on how Delhi government has implemented the scheme with different measures and the public response to the scheme. Even though the policy got mixed response and pollution level is not that much reduced but most of the people are happy to be part of the program and will continue to participate if it is extended. The reduction in the traffic congestion, concern for the future, and change in pollution levels made the general public more excited to experience faster travel to their destinations. A part from odd even rule other methods Delhi government implemented and business opportunities a raised were also discussed. Different traffic restrictions implemented worldwide are also evaluated in the paper.

Key Words: Air pollution, Odd even car number, traffic restrictions, congestion.

1. INTRODUCTION
Pollution level has been on the rise year by year. Especially winter months November and December show higher number of days in severe category which will be above the index. According to Indian air quality index November 2015 had 73% of severe days of pollution and December with 68% which is much higher when compared to last year. This is why winter days require more control on traffic when compared to other months.

According to the survey conducted by Indian Institute of Tropical meteorology, 45% of air pollution is caused due to Transport, 27% due to Domestic, 24% due to Industries, and 4% due to Industrial sector. According to the World Health Organistion (WHO), air pollution is the fifth largest killer in India. Recent study conducted by IIT Kanpur revealed that vehicles are the second largest emitter of PM2.5 after road dust.

To reduce the pollution caused by transport vehicles, driving restrictions are implemented in numerous cities across the world to reduce pollution and congestion. Long time ago, the Delhi Government recognized the congestion problem caused from an excess number of vehicles in the city. Some of the measures initiated to overcome this problem were expansion of roads, construction of flyovers, and streamlining traffic movements. Delhi High Court directed the Centre and State Governments to come up with comprehensive action plans to put a check on the capital city's "alarming" pollution rate, saying that living in Delhi is like "living in a gas chamber". Then, the Aam Admi Party (AAP) cabinet announced private vehicles will be allowed to run across the city based on alternate days based on odd or even registration numbers. This was tested for 15 days during January 1-15, 2016. So before going to the evaluation of this rule, let us have a glance on what odd even rule is and when it was started.
2. ODD-EVEN CAR RULE

This rule would define which car you can drive on a particular date. According to this rule vehicles are allowed on to the road according to the ending number of their vehicle registration number. Vehicles are allowed alternative days like one day with odd ending number and second day with even ending number. The odd–even formula has been applied in several metropolitan cities around the world in various forms and its impact has been mixed. This system was first implemented in Beijing in 2008 just before the summer Olympics. At first they thought of implementing it as a temporary measure but because of its effective results the rule was still continuing. Now it was implemented in Delhi for the first time in India.

3. TYPES OF VEHICLES ALLOWED

Delhi has more than 87 lakh vehicles, half of which hit the roads every day. Nearly 10 lakh private cars stayed off the roads in the national capital once the odd-even formula has implemented. All public and private odd number ending vehicles are allowed on Monday, Wednesday, and Friday and even number ending on Tuesday, Thursday, and Saturday which is applicable from 8 am to 8 pm. Sunday is exempted from this rule. A fine of Rs.2,000 (Rupees Two thousand only) is charged for violation. Even the vehicles coming from other state were to follow the rule. Continuation of this scheme was to be decided based on the number of violations which implied that the larger the number of violations, the less is the degree of acceptance from the people to this scheme. About 10,000 NCC and NSS volunteers are pressed into service who offered roses to violators so that there is a change in the mindset.

4. EXEMPTIONS

Vehicles exempted from this rule are: Vehicles with only women passengers or kids below 12, Commercial vehicles, All CNG-driven vehicles, electric, hybrid vehicles, two-wheelers, those on way to hospital for emergency (proof must), vehicles of the disabled, emergency vehicles, President, Vice-President, PM, LS Speaker, Deputy Speaker, RS Deputy Chairman, Governors, Lt Governors, Union Ministers, All CMs, except of Delhi, CJI, SC-HC judges and Lokayukta.

5. MULTIPRONGED STRATEGY

The government increased number of trains on the six metro lines and added more coaches to trains by making it additional 365 trips every day. Government procured about 1380 semi low floor buses, 500 mini buses under DTC and around 1000 more buses. About 5500 new auto permits are being released for plying in the NCR. The
six corridors in Phase-III Metro project has a plan for expansion of 117.57 Km of Metro Rail network in Delhi. Around 4,000 private contract CNG buses and 2,000 CNG school buses were added to the existing fleet of 6,000 DTC and cluster buses. Most of the public opted for carpooling. Twitter helped Delhites to search information for nearest bus stations and metro stations. 2000 police check posts were arranged to check for violators. Many students from schools and public acted as volunteers to create awareness.

6. POLLUTION STATISTICS BEFORE AND AFTER

Average PM 2.5 Concentration, 15 Days before Jan 1, 2016 & 15 fays since Jan 1,2016

![Pollution Statistics Graph](image)

**Fig 2**: Source: Breathe

**RESULTS OF THE ODD-EVEN TEST**
A look at the pollution and traffic levels during the 15 days of road rationing in Delhi.

![Odd-Even Test Graph](image)

**Fig 3**: Graph showing PM2.5 on all days of odd even rule
The average PM 2.5 has been increased at time of odd even, even though most of the vehicles stayed at home. This clearly indicates that four wheelers share in pollution is very less. The speed of the wind will also affect PM2.5 and PM 10. In first week of Jan 2016 the pollution level went to much high but after 8, Jan 2016 Delhi people started breathing some healthy air but it is contributed mostly to high speed of wind than odd-even rule.

Not only Indian organisations The Council on Energy, Environment and Water (CEEW) but also other country institutes like independent think tank in collaboration with the Energy Policy Institute at the University of Chicago, independently measured air quality and traffic volumes at five important locations in the city which included Connaught Place, GTB Nagar, IIT Delhi, Mathura Road and Shadipur, over the past three weeks and said that there is no conclusive evidence to prove that the odd-even policy improved Delhi’s air quality or reduced traffic congestion.

After analysing the collected data from all the monitors, results indicated that the average air pollution levels increased in the first week of January compared with the previous week. However, in the second week of January, air quality was marginally better, but still poorer than the last week of December.

“In the short-term, meteorological variables such as temperature, wind speed and precipitation have a significant impact, and as a result it is hard to provide conclusive evidence on the impact of the odd-even policy on air quality,” said a CEEW statement.

According to the think tank, an average PM2.5 level of 306 µg/m3 was recorded during the first two weeks of January, similar to the average level of 330 µg/m3 recorded during the first fortnight of January 2014.

Besides, a CEEW analysis of traffic movement and congestion finds that despite the implementation of the odd-even policy, the daily average number of vehicles increased by 10% in these five locations during the first two weeks of January as compared with the last week of December.

The think tank attributed this increase primarily to a 17% increase in two-wheelers, a 12% increase in three-wheelers, a 22% rise in taxis and a 138% rise in the number of private buses.

7. MAIN REASONS FOR AIR POLLUTION

Even though odd even rule was implemented the reduction in pollution is very negligible which shows that four wheelers aren’t the only culprits than what is the main reason?

IIT, Kanpur study shows road dust is the city’s biggest polluter, accounting for 38 percent of PM 2.5 and 56 percent of PM 10 concentration. Two wheelers, which are exempted from the odd-even rule, account for 33 percent of all PM10 and PM 2.5 emissions by vehicles, trucks emit 46 percent of all PM10 and PM 2.5, among vehicles, and are allowed to ply on roads only after 10:30 pm. Previously, they could travel 9 pm onwards. Four-wheelers contribute to only 10 percent of all PM 10 and PM 2.5 emissions by vehicles.

8. EFFECTIVENESS EVALUATION

Police was the first organization that expressed its inability to monitor a scheme of such size, in view of the inadequate police force. In order to overcome that 200 extra barricades were arranged to check the vehicles. Reservations came from women, professionals and celebrities citing safety, lack of public transport and a general disruption in city life.

The scheme was tweaked to exempt two-wheelers and single lady drivers to which there was further criticism. The government did not budge and the die was cast. The tedious and often unnecessary criticism on national TV actually helped bring the pollution debate to the centre stage and into heated public discussion. The odd-even formula also brought the rich and poor, irrespective of caste, gender and religion on a common level.
playing field with respect to access of a common resource - clean air. Students from various schools took the lead in making people aware of the odd even rules.

A pollution checking van was moving all through the city to monitor the pollution levels. The pollution levels decreased to an encouraging level. All people in Delhi accepted the new rule to control the pollution. By seeing the success rate, Delhi Government announced a second stage of implementation in July, 2016. At first criticism came but all those added to the success of the scheme. The violations recorded are also very low. Mr.Arvid Kejrival thanked all Dehiites for accepting and co-operating him in implementing the rule. First Delhi high court told to implement the rule for one week and after seeing the results it should be extended to 15 days. The rule is implemented for 15 days which alone shows its effectiveness rate.

At first government thought that violator’s number will be very high but very few violations were recorded which is up to 2500 only. On ninth day highest number 847 violations were recorded. The amount collected was 1.2 crore which will be utilized for extension of roads and providing more facilities. Metro has also not reported any stampedes but there are heavy queues at peak times. Overall the entire scheme was successful and this is likely to be emulated by other cities also.

9. PUBLIC RESPONSE

When the scheme was announced most of the people said it was very difficult to follow as the houses are far from bus stations and metro stations. They are afraid of auto drivers who will start charging more fare cashing on this type of situations. Especially women told that they will find difficulty in dropping and picking up their kids from school and old people find it difficult to go to hospitals. But when women and old people are exempted from rule they are much happy in welcoming.

Most of the professionals who are working far away also welcomed the change as they found that as traffic is reduced they are able to reach the destination with very less time and they are also happy to be part of that as they are contributing to the environment.

But some people expressed their view that odd even rule won’t work out in long run as Delhi people have enough money to afford for second vehicle. Some people told that auto drivers helped them and some other complained that they are charging a maximum up to Rs. 1000.

Some violators have given funny reasons to escape fine like one person was saying on even day that his car number starts with even and in the rules there is no clear mention that starting number or ending number will be considered. Some other told that why to keep restrictions let allow people to work from home so that zero pollution will be there. But most of the people said that they have seen so much of change in pollution and traffic. They are happily willing to participate even if the government extends the scheme. Finally words said by two people who are behind this scheme:

"I am truly overwhelmed by the response. People have achieved the impossible. I am sure Delhi will show the way,” said Arvind Kejrival.
"The same Delhi, which was called selfish, has shown the way. We thank all people for choosing their children’s health,” said Gopal Rai.

10. SOME OTHER MEASURES

The Government also announced a few of other measures that could help curb air pollution, including stopping roadside parking to battle congestion, improving the public transportation system and bringing cleaner fuel to the city before the rest of the country. The city also plans to shut down one of its oldest and least efficient thermal power plants. The Badarpur plant, commissioned in the early 1970s, uses out dated equipment and often breaks down. Traffic police will also be told to ensure that diesel-guzzling trucks, which transit through the city
at night, enter only after 11pm. currently trucks are allowed to enter the city at 9pm, often resulting in massive traffic jams. Diesel cars and SUVs with more than 2000 cc have been banned from registration up to 31st March, 2016.

11. BUSINESS OPPORTUNITIES

So many new startups have come up providing apps to Delhi public to commute odd even days. Cab providing firms like Ola, Meru, and Uber came up with option of carpooling to the passengers. Meru launched a mobile application in January to help passengers pool cabs. This app will identify two people within a radius of two-three km travelling in the same direction and can share their taxi ride. Taxi aggregator Ola recently launched minibus shuttle services in Gurgaon and Noida and could extend this to Delhi. 13-year old student of Amity International school has developed an website www.odd-even.com to reach the information to public. Auto driver’s income has increased as people started using autos than public transport and to go home from stations. Demand for resale vehicles will also increase because if public transport fails in meeting the needs of the people they opt for another vehicle with other register number.

12. DRIVING RESTRICTIONS FOLLOWED WORLDWIDE

Road restrictions on vehicles are not new to the world. In ancient Rome in 45 BC Julius Ceasar banned wheeled traffic in the city center during day times because of congestion. Early in the 1970s, Buenos Aires, the capital and the largest city of Argentina, banned one-half of automobiles from entering the city center on a given day based on odd or even last digit of the plate number. A similar restriction program was also used in 1980s in Caracas, the capital and largest city in Venezuela, and then in Athens between 1985 and 1991. In Mexico City the odd-even rati oning policy was introduced as early as 1989. Cars were banned for one day per week depending on the last number on their number plate. On Mondays five and six were banned, on Tuesdays seven and eight, etc. In Bogota, capital of Columbia, cars were banned during the peak hours for two days per week. In order to make it harder for citizens to break the rule by buying two cars, the government kept on switching the combination of days and numbers every year. According to some reports, the policy failed to control pollution as many drivers chose to drive during off-peak hours thus rendering the government appointed peak hours as useless.

Ahead of 2008 Olympics, Beijing imposed restrictions on private vehicles by allowing even and odd license plates to drive on alternate days. In March 2014, Paris introduced the odd-even rationing on its roads just for a day as an experiment. The experiment has been tried once before in 1997 and dropped similarly after a day. Europe decided to control emission in its capitals by declaring certain part of the cities as LEZs and banning vehicles which failed a particular standard from entering them.

However, some theoretical and empirical research argued against the driving restriction policy, “calling it unjust and inefficient” (de Grange and Troncoso, 2011). It is inefficient due to either non-compliance or compensating responses, such as changing driving times (inter-temporal substitution) or adding a second vehicle with a different license plate. The restrictions do not take into account individual preferences – in other words, different individuals’ willingness to pay different amounts to make trips that are personally important to them (de Grange and Troncoso, 2011). In addition, residents who live far away from subway stations or bus stops have less chance than others to find substitutes for car trips. As a result, it is more likely that they might break the rules to make certain trips. In most developing countries, the public transport system is a very imperfect substitute for cars. This might induce drivers to adapt to the restrictions by purchasing additional cars. Evidence from Mexico City has shown that wealthy people are able to buy second cars with different license plates to circumvent the ban, and therefore, total car use in Mexico City has, in fact, increased (Eskeland and Feyzioglu, 1997). These additional cars were typically older and generated more pollution, which in turn made air pollution even worse (Eskeland and Feyzioglu, 1997).
13. CONCLUSION AND FUTURE RESEARCH

Air-pollution levels in Delhi rose 15 percent during the 15-day period (January 1 to 15, 2016) of the state government’s odd-even measure over the previous 15 days (December 17 to 31, 2015). The increase in PM 2.5 level indicates the need to understand deeper the impact of policy changes, such as the odd-even measure, on Delhi’s air. With four-wheeled vehicles accounting for no more than 10% of the city’s overall vehicular pollution load, according to a new Indian Institute of Technology (IIT) study, the need for other measures is obvious. Over all the scheme was more successful for the reduction in traffic and reduced time of reaching destination, but pollution reduction is not identified clearly. In the middle days change in pollution has been noticed but it is attributed to the speed of wing. Even though Delhi odd even car rule is successful for 15 days in order to get even best results in long run Government has to provide and regulate the public transportation which can address the needs of public.

REFERENCES


WEBSITES AND NEWS CHANNELS

13. DD news January 1 2016, 8:00 pm.
15. IBN 7, January 7 2016, 9:00 am.